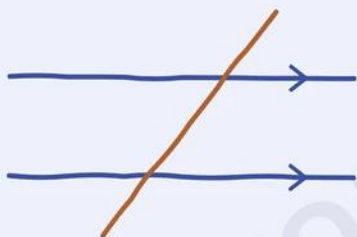


the angle sum, the tests for congruence, and the inequalities that decide what can be built

The two angle results everything starts from

- * the three interior angles of any triangle add to 180° , whatever its shape or size
- the proof draws a line through one vertex parallel to the opposite side, then uses alternate angles to move the two base angles up to that vertex
- an exterior angle is formed by producing one side, and it equals the sum of the two interior opposite angles
- that follows at once from the angle sum, since the exterior angle and its own interior angle form a linear pair
- so an exterior angle is greater than either of the two remote interior angles taken alone
- a triangle can have at most one angle that is 90° or more, since two such angles would already reach 180°



a line drawn through the top vertex parallel to the base: the two base angles reappear at that vertex as alternate angles, and together with the angle already there they fill a straight line, which is exactly why the three add to 180°

Naming triangles two ways

- by sides: scalene has three unequal sides, isosceles has two equal, equilateral has all three equal
- by angles: acute has all three angles under 90° , right has exactly one at 90° , obtuse has one above 90°
- an equilateral triangle is also equiangular, every angle being 60°
- in an isosceles triangle the angles opposite the equal sides are equal, and the converse holds too
- the larger angle lies opposite the longer side, which is the ordering rule used constantly in proofs
- the two namings are independent, so a triangle can be right angled and isosceles at the same time

The tests for congruence

SAS

two sides and the included angle. The angle must lie between the two sides, and an angle elsewhere does not prove congruence

SSS

all three sides equal. No angle information is needed, because three fixed lengths can build only one triangle shape

ASA and AAS

two angles and one corresponding side. Once two angles are known the third follows, so the side may be included or not, provided it corresponds

RHS

for right angled triangles only: the hypotenuse and one other side. This is the one case where a non included side with an angle is enough

AAA is deliberately absent. Equal angles alone give only similarity, since the two triangles may be any size, and writing AAA as a congruence test loses the mark